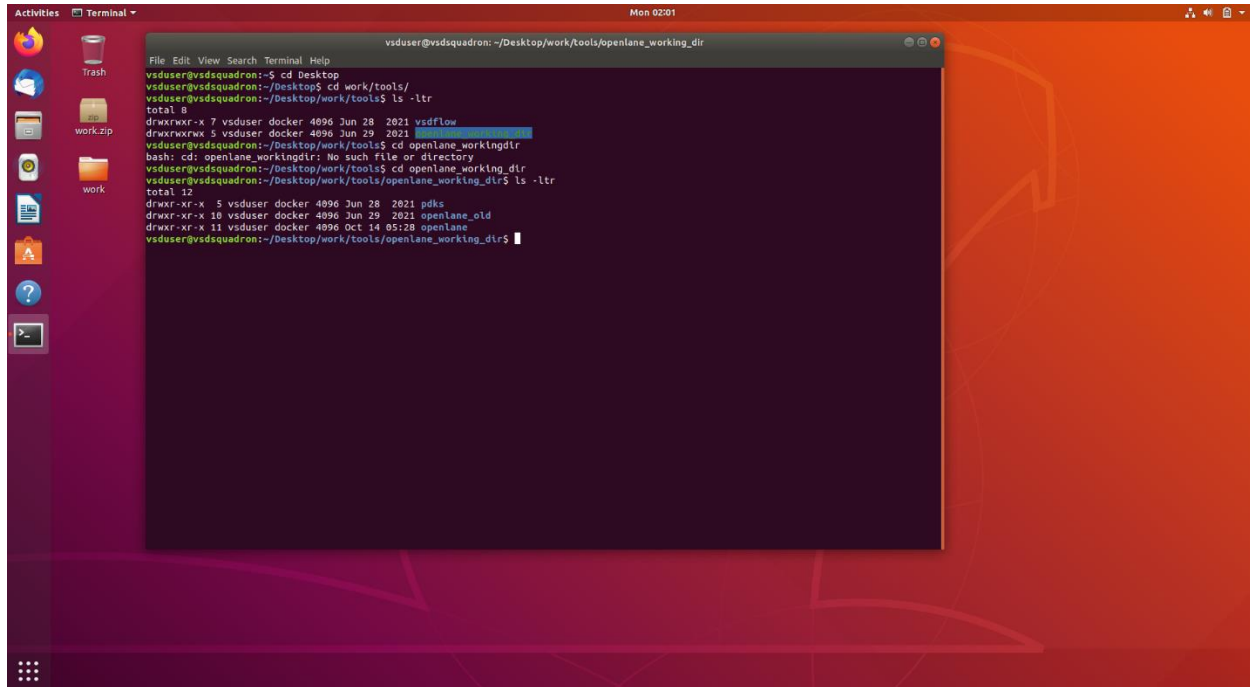


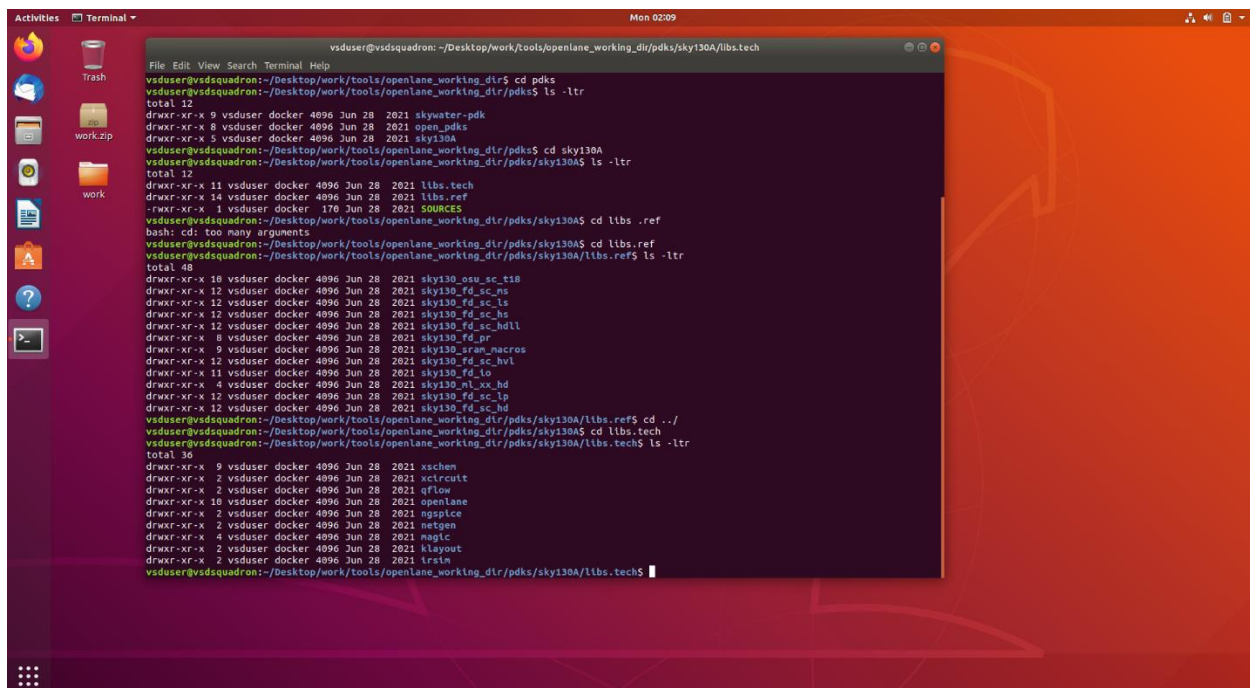
DAY 1 Labs: This report comprises of all commands run and various results obtained during the first day of the workshop.



```

vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir
File Edit View Search Terminal Help
vdsuser@vdsquadron:~$ cd Desktop
vdsuser@vdsquadron:~/Desktop$ cd work/tools/
vdsuser@vdsquadron:~/Desktop/work/tools$ ls -ltr
total 8
drwxr-xr-x 7 vdsuser docker 4096 Jun 28 2021 vsdflow
vdsuser@vdsquadron:~/Desktop/work/tools$ cd openlane_workingdir
bash: cd: openlane_workingdir: No such file or directory
vdsuser@vdsquadron:~/Desktop/work/tools$ cd openlane_working_dir
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir$ ls -ltr
total 12
drwxr-xr-x 5 vdsuser docker 4096 Jun 28 2021 pdks
drwxr-xr-x 10 vdsuser docker 4096 Jun 29 2021 openlane_old
drwxr-xr-x 11 vdsuser docker 4096 Oct 14 05:28 openlane
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir$

```



```

vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech
File Edit View Search Terminal Help
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir$ cd pdks
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks$ ls -ltr
total 12
drwxr-xr-x 9 vdsuser docker 4096 Jun 28 2021 skywater-pdk
drwxr-xr-x 8 vdsuser docker 4096 Jun 28 2021 open_pdk
drwxr-xr-x 5 vdsuser docker 4096 Jun 28 2021 sky130A
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks$ cd sky130A
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A$ ls -ltr
total 12
drwxr-xr-x 11 vdsuser docker 4096 Jun 28 2021 libs.tech
drwxr-xr-x 14 vdsuser docker 4096 Jun 28 2021 libs.ref
-rwxr-xr-x 1 vdsuser docker 178 Jun 28 2021 SOURCES
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A$ cd libs.ref
bash: cd: too many arguments
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A$ cd libs.ref
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref$ ls -ltr
total 48
drwxr-xr-x 10 vdsuser docker 4096 Jun 28 2021 sky130_osv_sc_t18
drwxr-xr-x 12 vdsuser docker 4096 Jun 28 2021 sky130_fd_sc_ms
drwxr-xr-x 12 vdsuser docker 4096 Jun 28 2021 sky130_fd_sc_ls
drwxr-xr-x 12 vdsuser docker 4096 Jun 28 2021 sky130_fd_sc_hs
drwxr-xr-x 12 vdsuser docker 4096 Jun 28 2021 sky130_fd_sc_hdll
drwxr-xr-x 8 vdsuser docker 4096 Jun 28 2021 sky130_fd_pr
drwxr-xr-x 9 vdsuser docker 4096 Jun 28 2021 sky130_sram_macros
drwxr-xr-x 12 vdsuser docker 4096 Jun 28 2021 sky130_fd_sc_hvl
drwxr-xr-x 11 vdsuser docker 4096 Jun 28 2021 sky130_fd_lo
drwxr-xr-x 4 vdsuser docker 4096 Jun 28 2021 sky130_n1_x1_hd
drwxr-xr-x 12 vdsuser docker 4096 Jun 28 2021 sky130_fd_sc_tlp
drwxr-xr-x 12 vdsuser docker 4096 Jun 28 2021 sky130_fd_sc_hd
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref$ cd ../
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A$ cd libs.tech
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech$ ls -ltr
total 36
drwxr-xr-x 9 vdsuser docker 4096 Jun 28 2021 xschen
drwxr-xr-x 2 vdsuser docker 4096 Jun 28 2021 xelcutt
drwxr-xr-x 2 vdsuser docker 4096 Jun 28 2021 qlow
drwxr-xr-x 10 vdsuser docker 4096 Jun 28 2021 openlane
drwxr-xr-x 2 vdsuser docker 4096 Jun 28 2021 hgsplce
drwxr-xr-x 2 vdsuser docker 4096 Jun 28 2021 netgen
drwxr-xr-x 4 vdsuser docker 4096 Jun 28 2021 magic
drwxr-xr-x 2 vdsuser docker 4096 Jun 28 2021 klayout
drwxr-xr-x 2 vdsuser docker 4096 Jun 28 2021 lrsin
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech$

```

```

Activities Terminal Mon 02:12
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd
File Edit View Search Terminal Help
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 xcrlcutt
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 gflow
drwxr-xr-x 10 vsduser docker 4096 Jun 28 2021 openlane
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 ngspice
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 netgen
drwxr-xr-x 4 vsduser docker 4096 Jun 28 2021 nagte
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 klayout
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 lrstn
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech$ cd ../
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A$ ls -ltr
total 12
drwxr-xr-x 11 vsduser docker 4096 Jun 28 2021 libs.tech
drwxr-xr-x 14 vsduser docker 4096 Jun 28 2021 libs.ref
-rwxr-xr-x 1 vsduser docker 170 Jun 28 2021 500cccs
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A$ cd libs.ref
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref$ ls -ltr
total 48
drwxr-xr-x 10 vsduser docker 4096 Jun 28 2021 sky130_osv_sc_t18
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_ns
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_ls
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_hs
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_hdl
drwxr-xr-x 8 vsduser docker 4096 Jun 28 2021 sky130_fd_pr
drwxr-xr-x 9 vsduser docker 4096 Jun 28 2021 sky130_sram_macros
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_hv1
drwxr-xr-x 11 vsduser docker 4096 Jun 28 2021 sky130_fd_lo
drwxr-xr-x 4 vsduser docker 4096 Jun 28 2021 sky130_n1_xx_hd
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_lp
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_hd
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref$ cd sky130_fd_sc_hd
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd$ ls -ltr
total 88
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 verilog
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 techlef
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 spice
drwxr-xr-x 2 vsduser docker 28672 Jun 28 2021 maglef
drwxr-xr-x 2 vsduser docker 28672 Jun 28 2021 nag
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 lib
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 lef
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 gds
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 doc
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 cdl
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd$

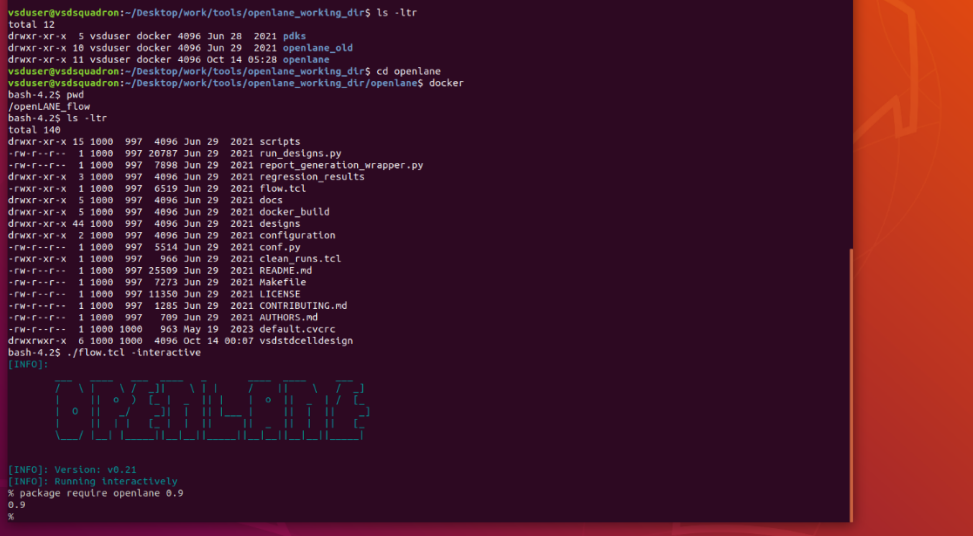
```

```

Activities Terminal Mon 02:13
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/lib
File Edit View Search Terminal Help
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 lef
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 gds
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 doc
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 cdl
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd$ cd lef
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/lef$ ls -ltr
total 2212
-rwxr-xr-x 1 vsduser docker 1822 Jun 28 2021 sky130_ef_sc_hd_full_12.lef
-rwxr-xr-x 1 vsduser docker 1453 Jun 28 2021 sky130_ef_sc_hd_fakediode_2.lef
-rwxr-xr-x 1 vsduser docker 1947 Jun 28 2021 sky130_ef_sc_hd_decap_12.lef
-rwxr-xr-x 1 vsduser docker 2252747 Jun 28 2021 sky130_fd_sc_hd.lef
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/lef$ cd ../
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd$ cd verilog
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/verilog$ ls -ltr
total 2340
-rwxr-xr-x 1 vsduser docker 1930 Jun 28 2021 sky130_ef_sc_hd_full_12.v
-rwxr-xr-x 1 vsduser docker 2540 Jun 28 2021 sky130_ef_sc_hd_fakediode_2.v
-rwxr-xr-x 1 vsduser docker 2063 Jun 28 2021 sky130_ef_sc_hd_decap_12.v
-rwxr-xr-x 1 vsduser docker 50512 Jun 28 2021 primitives.v
-rwxr-xr-x 1 vsduser docker 2327991 Jun 28 2021 sky130_fd_sc_hd.v
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/verilog$ cd ../
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd$ cd lib
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/lib$ ls -ltr
total 447344
-rwxr-xr-x 1 vsduser docker 12839325 Jun 28 2021 sky130_fd_sc_hd_tt_100c_iv80.lib
-rwxr-xr-x 1 vsduser docker 12840502 Jun 28 2021 sky130_fd_sc_hd_tt_025c_iv80.lib
-rwxr-xr-x 1 vsduser docker 12838573 Jun 28 2021 sky130_fd_sc_hd_ss_n40c_iv76.lib
-rwxr-xr-x 1 vsduser docker 67865927 Jun 28 2021 sky130_fd_sc_hd_ss_n40c_iv60.lib
-rwxr-xr-x 1 vsduser docker 67866428 Jun 28 2021 sky130_fd_sc_hd_ss_n40c_iv80_ccsnote.lib
-rwxr-xr-x 1 vsduser docker 12841363 Jun 28 2021 sky130_fd_sc_hd_ss_n40c_iv44.lib
-rwxr-xr-x 1 vsduser docker 12844330 Jun 28 2021 sky130_fd_sc_hd_ss_n40c_iv80.lib
-rwxr-xr-x 1 vsduser docker 12843147 Jun 28 2021 sky130_fd_sc_hd_ss_n40c_iv35.lib
-rwxr-xr-x 1 vsduser docker 12837196 Jun 28 2021 sky130_fd_sc_hd_ss_n40c_iv28.lib
-rwxr-xr-x 1 vsduser docker 12844125 Jun 28 2021 sky130_fd_sc_hd_ss_100c_iv60.lib
-rwxr-xr-x 1 vsduser docker 12845948 Jun 28 2021 sky130_fd_sc_hd_ss_100c_iv40.lib
-rwxr-xr-x 1 vsduser docker 71255259 Jun 28 2021 sky130_fd_sc_hd_ff_n40c_iv95.lib
-rwxr-xr-x 1 vsduser docker 71255751 Jun 28 2021 sky130_fd_sc_hd_ff_n40c_iv95_ccsnote.lib
-rwxr-xr-x 1 vsduser docker 12843851 Jun 28 2021 sky130_fd_sc_hd_ff_n40c_iv76.lib
-rwxr-xr-x 1 vsduser docker 12842973 Jun 28 2021 sky130_fd_sc_hd_ff_n40c_iv65.lib
-rwxr-xr-x 1 vsduser docker 12842102 Jun 28 2021 sky130_fd_sc_hd_ff_n40c_iv56.lib
-rwxr-xr-x 1 vsduser docker 12841550 Jun 28 2021 sky130_fd_sc_hd_ff_100c_iv95.lib
-rwxr-xr-x 1 vsduser docker 12840659 Jun 28 2021 sky130_fd_sc_hd_ff_100c_iv65.lib
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/lib$

```

To start openlane the following three commands are used



The screenshot shows a Linux desktop environment with a terminal window open. The terminal displays the output of a file listing command and a directory structure.

Terminal Window Title: vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane

Terminal Content:

```
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir$ ls -ltr
total 12
drwxr-xr-x 5 vdsuser docker 4096 Jun 28 2021 pdks
drwxr-xr-x 10 vdsuser docker 4096 Jun 29 2021 openlane_old
drwxr-xr-x 11 vdsuser docker 4096 Oct 14 05:28 openlane
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir$ cd openlane
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane$ docker
bash-4.25$ pwd
/openlane_flow
bash-4.25$ ls -ltr
total 140
drwxr-xr-x 15 1000 997 4096 Jun 29 2021 scripts
-rw-r--r-- 1 1000 997 20787 Jun 29 2021 run_designs.py
-rw-r--r-- 1 1000 997 7898 Jun 29 2021 report_generation_wrapper.py
drwxr-xr-x 3 1000 997 4096 Jun 29 2021 regression_results
-rw-r-xr-x 1 1000 997 6519 Jun 29 2021 flow.tcl
drwxr-xr-x 5 1000 997 4096 Jun 29 2021 docs
drwxr-xr-x 5 1000 997 4096 Jun 29 2021 docker_build
drwxr-xr-x 44 1000 997 4096 Jun 29 2021 designs
drwxr-xr-x 2 1000 997 4096 Jun 29 2021 configuration
-rw-r--r-- 1 1000 997 5514 Jun 29 2021 conf.py
-rw-r-xr-x 1 1000 997 966 Jun 29 2021 clean_runs.tcl
-rw-r--r-- 1 1000 997 25500 Jun 29 2021 README.md
-rw-r--r-- 1 1000 997 7273 Jun 29 2021 Makefile
-rw-r--r-- 1 1000 997 11350 Jun 29 2021 LICENSE
-rw-r--r-- 1 1000 997 1285 Jun 29 2021 CONTRIBUTING.md
-rw-r--r-- 1 1000 997 789 Jun 29 2021 AUTHORS.md
-rw-r--r-- 1 1000 1000 963 May 19 2023 default.cvcrc
drwxr-xr-x 6 1000 1000 4096 Oct 14 00:07 vstdtdcelldesign
bash-4.25$ ./flow.tcl -interactive
[INFO]
```

The directory structure shown in the terminal is as follows:

```

├── docs
├── docker_build
├── designs
├── configuration
├── conf.py
├── clean_runs.tcl
├── README.md
├── Makefile
├── LICENSE
├── CONTRIBUTING.md
├── AUTHORS.md
├── default.cvcrc
├── vstdtdcelldesign
└── scripts

```

The terminal also displays the following information:

```

[INFO]: Version: v0.21
[Info]: Running interactively
% package require openlane 0.9
0.9
%

```

Picorv32a directory and its contents

The image shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for the Dash (Activities), Home, Files (Nautilus), and several application icons including a web browser, a file manager, and a terminal. The main area of the screen is occupied by a terminal window titled "Terminal". The terminal's title bar shows the user "vdsuser" and the current directory "~Desktop/work/tools/openlane_working_dir/openlane/designs". The terminal window displays the output of a command that lists files and their metadata. The output is a table with columns for file permissions, owner, group, size, date, time, and filename. The files listed include various device drivers (usb_device, usb_cdc_core, usb, synth_ram, sound), cryptographic hashes (sha512, sha3, sha256), and other system files (README.md, PPU, point_scalar_mult, point_add, ocs_bllitter, mds, manual_macro_placement_test, ldpcenc, ldpc_decoder_802_3an, jpeg_encoder, inverter, genericfft, digital_pll_sky130_fd_sc_hd, des3, des, ctc_decoder, chacha, BHE4, blabla, APN, aes_core, aes_cipher, aes256, aes192, aes128, aes, lsi, spm). The terminal window also shows the user's prompt and the command they entered: "vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs\$ cd picorv32" and "bash: cd: picorv32: No such file or directory". The terminal window is closed, and the desktop background is a solid dark color.


```

vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a
File Edit View Search Terminal Help
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 point_scalar_mult
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 point_add
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 ecc_bllitter
drwxr-xr-x 4 vdsuser docker 4096 Jun 29 2021 mds
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 manual_macro_placement_test
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 ldpcenc
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 ldpc_decoder_802_3an
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 jpeg_encoder
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 inverter
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 genertcfir
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 digital_pll_sky130_fd_sc_hd
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 des3
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 des
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 ctc_declnater
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 chacha
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 BM64
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 blablal
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 apu
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 aes_core
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 aes_cipher
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 aes156
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 aes192
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 aes128
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 aes
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 isi
drwxr-xr-x 4 vdsuser docker 4096 Jun 29 2021 spm
drwxr-xr-x 4 vdsuser docker 4096 Oct 12 06:57 picorv32a
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs$ cd picorv32
bash: cd: picorv32: no such file or directory
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs$ cd picorv32a
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ ls -ltr
total 32
drwxr-xr-x 2 vdsuser docker 4096 Jun 29 2021 src
-rw-r--r-- 1 vdsuser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ms_config.tcl
-rw-r--r-- 1 vdsuser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ls_config.tcl
-rw-r--r-- 1 vdsuser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hs_config.tcl
-rw-r--r-- 1 vdsuser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hdll_config.tcl
-rwxr-xr-x 1 vdsuser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hd_config.tcl
-rwxr-xr-x 1 vdsuser docker 444 Jun 29 2021 config.tcl
drwxr-xr-x 5 vdsuser vdsuser 4096 Oct 12 19:22 runs
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$

```

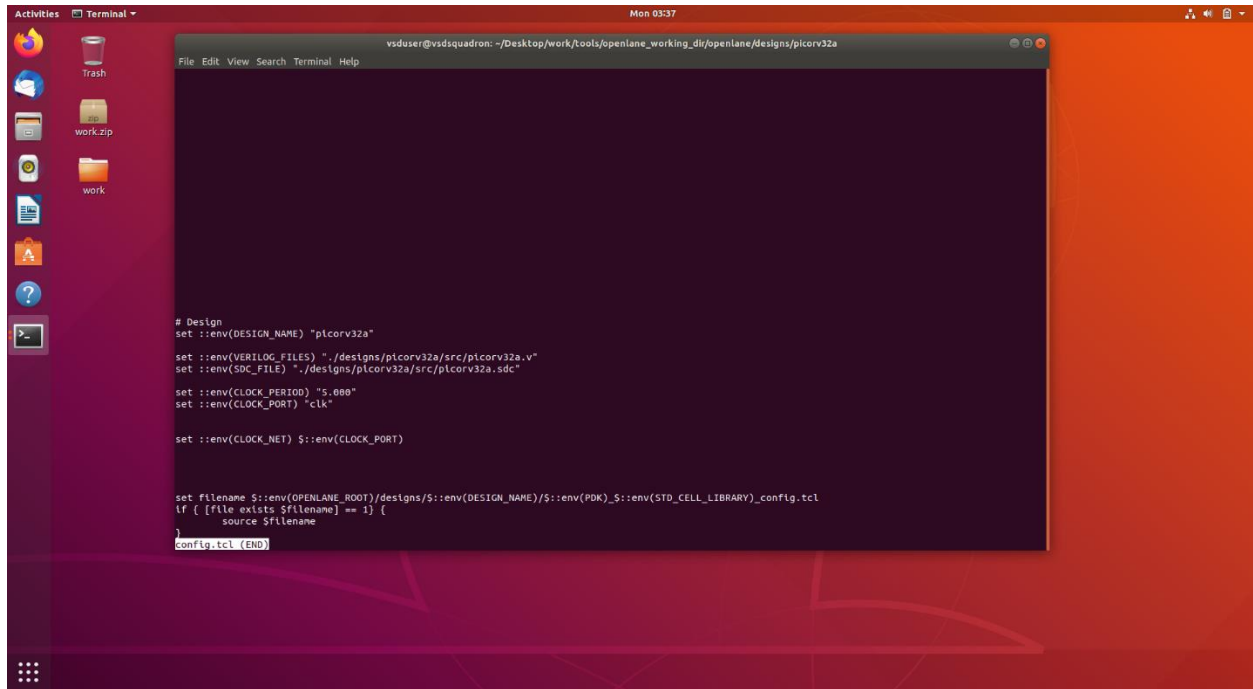
To view the contents of the config.tcl file use the `less` command

```

vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a
File Edit View Search Terminal Help
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 inverter
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 genertcfir
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 digital_pll_sky130_fd_sc_hd
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 des3
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 des
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 ctc_declnater
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 chacha
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 BM64
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 blablal
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 apu
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 aes_core
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 aes_cipher
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 aes156
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 aes192
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 aes128
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 aes
drwxr-xr-x 3 vdsuser docker 4096 Jun 29 2021 isi
drwxr-xr-x 4 vdsuser docker 4096 Jun 29 2021 spm
drwxr-xr-x 4 vdsuser docker 4096 Oct 12 06:57 picorv32a
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs$ cd picorv32
bash: cd: picorv32: no such file or directory
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs$ cd picorv32a
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ ls -ltr
total 32
drwxr-xr-x 2 vdsuser docker 4096 Jun 29 2021 src
-rw-r--r-- 1 vdsuser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ms_config.tcl
-rw-r--r-- 1 vdsuser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ls_config.tcl
-rw-r--r-- 1 vdsuser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hs_config.tcl
-rw-r--r-- 1 vdsuser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hdll_config.tcl
-rwxr-xr-x 1 vdsuser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hd_config.tcl
-rwxr-xr-x 1 vdsuser docker 444 Jun 29 2021 config.tcl
drwxr-xr-x 5 vdsuser vdsuser 4096 Oct 12 19:22 runs
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ cd src
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/src$ ls -ltr
total 96
-rw-r--r-- 1 vdsuser docker 92423 Jun 29 2021 picorv32a.v
-rw-r--r-- 1 vdsuser docker 77 Jun 29 2021 picorv32a.sdc
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/src$ less config.tcl
config.tcl: No such file or directory
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/src$ cd ../
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ less config.tcl

```

The various parameters of the config.tcl file



```

vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/Designs/picorv32a
File Edit View Search Terminal Help

# Design
set ::env(DSIGN_NAME) "picorv32a"

set ::env(VERILOG_FILES) ".designs/picorv32a/src/picorv32a.v"
set ::env(SDC_FILE) ".designs/picorv32a/src/picorv32a.sdc"

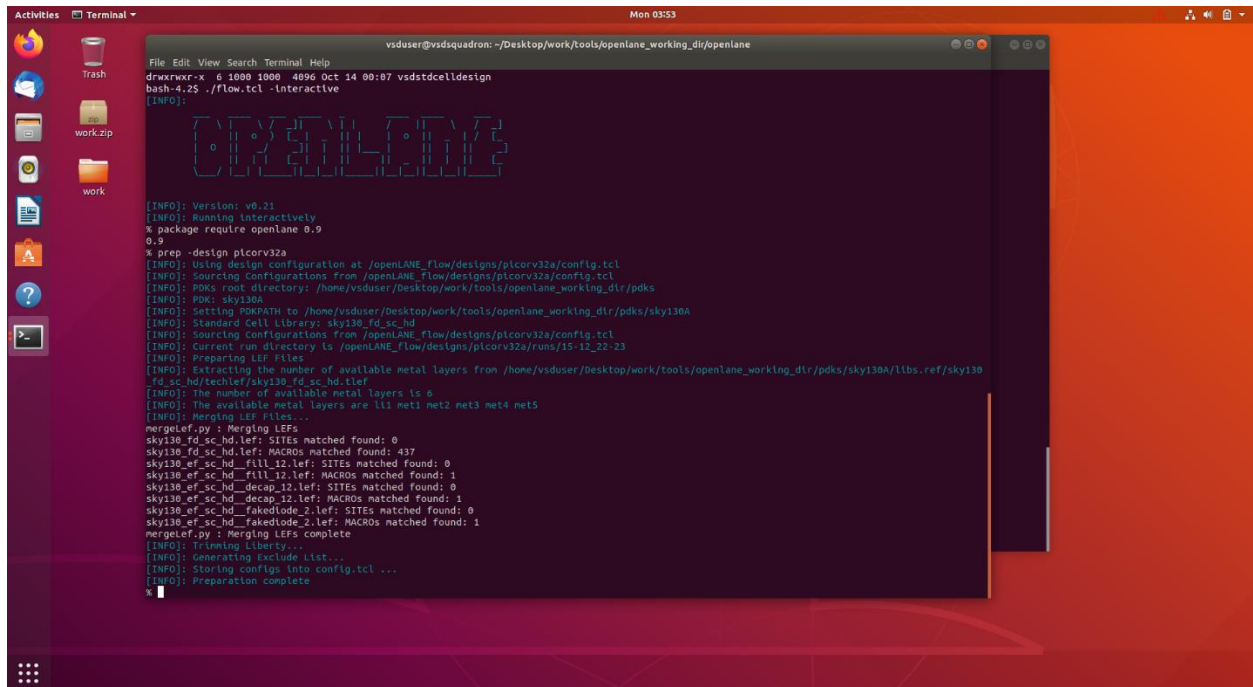
set ::env(CLOCK_PERIOD) "5.000"
set ::env(CLOCK_PORT) "clk"

set ::env(CLOCK_NET) $::env(CLOCK_PORT)

set filename $::env(OPENLANE_ROOT)/designs/$::env(DSIGN_NAME)/$::env(PDK)_$::env(STD_CELL_LIBRARY)_config.tcl
if { [file exists $filename] == 1 } {
    source $filename
}
config.tcl (END)

```

Prepare the design using the prep -design *design name* command



```

vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
File Edit View Search Terminal Help
drwxrwxr-x 6 1000 1000 4096 Oct 14 00:07 vdsstdcelldesign
bash-4.25 ./flow.tcl -Interactive
[INFO]:
[INFO]: Version: v0.21
[INFO]: Running interactively
% package require openlane 0.9
0.9
% prep -design picorv32a
[INFO]: Using design configuration at /openlane_flow/designs/picorv32a/config.tcl
[INFO]: Sourcing configurations from /openlane_flow/designs/picorv32a/config.tcl
[INFO]: PDKs root directory: /home/vdsuser/Desktop/work/tools/openlane_working_dir/pdks
[INFO]: PDK: sky130A
[INFO]: Setting ROMPATH to /home/vdsuser/Desktop/work/tools/openlane_working_dir/pdks/sky130A
[INFO]: Standard Cell Library: sky130_fd_sc_hd
[INFO]: Sourcing Configurations from /openlane_flow/designs/picorv32a/config.tcl
[INFO]: Current run directory is /openlane_flow/designs/picorv32a/runs/15-12-22-23
[INFO]: Preparing LEF files
[INFO]: Extracting the number of available metal layers from /home/vdsuser/Desktop/work/tools/openlane_working_dir/pdks/sky130A/lib/sky130
_fd_sc_hd/techlef/sky130_fd_sc_hd.tlef
[INFO]: The number of available metal layers is 6
[INFO]: The available metal layers are l1l met1 met2 met3 met4 met5
[INFO]: Merging LEF files...
mergelef.py : Merging LEFs
sky130_fd_sc_hd.lef: SITES matched found: 0
sky130_fd_sc_hd.lef: MACROS matched found: 437
sky130_ef_sc_hd_fll12.lef: SITES matched found: 0
sky130_ef_sc_hd_fll12.lef: MACROS matched found: 1
sky130_ef_sc_hd_decap12.lef: SITES matched found: 0
sky130_ef_sc_hd_decap12.lef: MACROS matched found: 1
sky130_ef_sc_hd_fakediode2.lef: SITES matched found: 0
sky130_ef_sc_hd_fakediode2.lef: MACROS matched found: 1
mergelef.py : Merging LEFs complete
[INFO]: Trimming Liberty...
[INFO]: Generating Exclude List...
[INFO]: Storing configs into config.tcl ...
[INFO]: Preparation complete
%

```

A new folder with the current date would be created

The image consists of two screenshots of a Linux terminal window. The top screenshot shows a directory listing of files in the path `~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs`. The files are listed with permissions, user, group, size, date, and filename. The bottom screenshot shows the same directory after a new folder named `15-12-22-23` has been created, and the terminal shows the command to create it: `mkdir 15-12-22-23`.

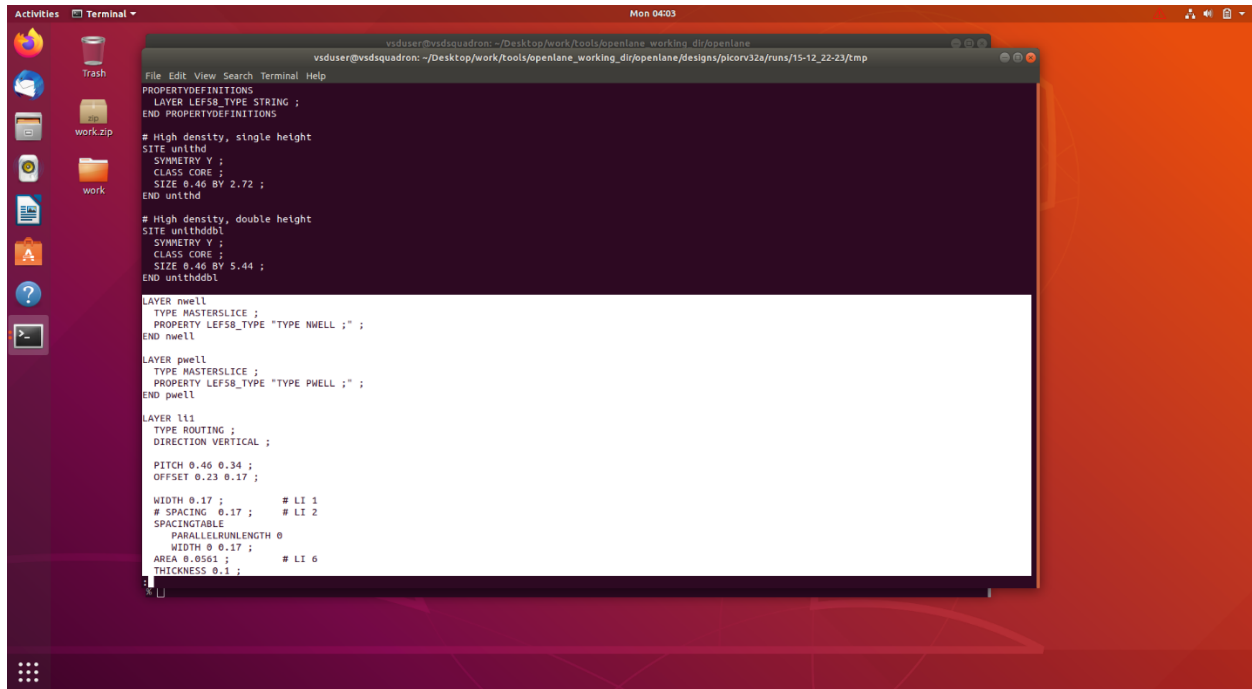
```

Mon 04:01
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs
d File Edit View Search Terminal Help
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 blabla
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 APU
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 aes_core
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 aes_cipher
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 aes256
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 aes192
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 aes128
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 151
drwxr-xr-x 4 vsduser docker 4096 Jun 29 2021 spm
drwxr-xr-x 4 vsduser docker 4096 Oct 12 06:57 picorv32a
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs$ cd picorv32a
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ ls -ltr
total 32
drwxr-xr-x 2 vsduser docker 4096 Jun 29 2021 src
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ms_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ls_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hs_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hdll_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hd_config.tcl
drwxr-xr-x 1 vsduser docker 444 Jun 29 2021 config.tcl
drwxr-xr-x 5 vsduser vsduser 4096 Oct 13 10:22 runs
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ cd sky130A_sky130_fd_sc_hd_config.tcl
bash: cd: sky130A_sky130_fd_sc_hd_config.tcl: Not a directory
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ less sky130A_sky130_fd_sc_hd_config.tcl
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ ls -ltr
total 32
drwxr-xr-x 2 vsduser docker 4096 Jun 29 2021 src
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ms_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ls_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hs_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hdll_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hd_config.tcl
drwxr-xr-x 1 vsduser docker 444 Jun 29 2021 config.tcl
drwxr-xr-x 6 vsduser vsduser 4096 Dec 16 03:53 runs
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ cd runs
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs$ ls -ltr
total 16
drwxr-xr-x 6 vsduser vsduser 4096 Oct 12 06:57 12-10-01-27
drwxr-xr-x 6 vsduser vsduser 4096 Oct 12 07:39 12-10-02-01
drwxr-xr-x 6 vsduser vsduser 4096 Oct 14 03:43 13-10-04-52
drwxr-xr-x 6 vsduser vsduser 4096 Dec 16 03:53 15-12-22-23
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs$ cd
x

Mon 04:02
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23/tmp
d File Edit View Search Terminal Help
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hs_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hdll_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hd_config.tcl
drwxr-xr-x 1 vsduser docker 444 Jun 29 2021 config.tcl
drwxr-xr-x 6 vsduser vsduser 4096 Dec 16 03:53 runs
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ cd runs
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs$ ls -ltr
total 16
drwxr-xr-x 6 vsduser vsduser 4096 Oct 12 06:57 12-10-01-27
drwxr-xr-x 6 vsduser vsduser 4096 Oct 12 07:39 12-10-02-01
drwxr-xr-x 6 vsduser vsduser 4096 Oct 14 03:43 13-10-04-52
drwxr-xr-x 6 vsduser vsduser 4096 Dec 16 03:53 15-12-22-23
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs$ cd 15-12-22-23
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23$ ls -ltr
total 52
-rwxr-xr-x 1 vsduser vsduser 170 Jun 28 2021 PDK_SOURCES
drwxr-xr-x 11 vsduser vsduser 4096 Dec 16 03:53 tmp
drwxr-xr-x 11 vsduser vsduser 4096 Dec 16 03:53 results
drwxr-xr-x 11 vsduser vsduser 4096 Dec 16 03:53 reports
-rw-r--r-- 1 vsduser vsduser 1585 Dec 16 03:53 cnds.log
-rw-r--r-- 1 vsduser vsduser 15 Dec 16 03:53 OPENLANE_VERSION
-rw-r--r-- 1 vsduser vsduser 20869 Dec 16 03:53 config.tcl
drwxr-xr-x 11 vsduser vsduser 4096 Dec 16 03:53 logs
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23$ cd tmp
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23/tmp$ ls -ltr
total 10620
-rwxr-xr-x 1 vsduser vsduser 202 Jun 28 2021 tracks_copy.info
-rw-r--r-- 1 vsduser vsduser 2264912 Dec 16 03:53 merged.lef
-rw-r--r-- 1 vsduser vsduser 33 Dec 16 03:53 met_layers.lst.txt
-rw-r--r-- 1 vsduser vsduser 2264912 Dec 16 03:53 merged_unpadded.lef
-rwxr-xr-x 1 vsduser vsduser 6975 Dec 16 03:53 trlmed.lib.exclude.list
-rw-r--r-- 1 vsduser vsduser 6291198 Dec 16 03:53 trlmed.lib
drwxr-xr-x 2 vsduser vsduser 4096 Dec 16 03:53 synthesis
drwxr-xr-x 2 vsduser vsduser 4096 Dec 16 03:53 placement
drwxr-xr-x 2 vsduser vsduser 4096 Dec 16 03:53 Floorplan
drwxr-xr-x 2 vsduser vsduser 4096 Dec 16 03:53 cts
drwxr-xr-x 2 vsduser vsduser 4096 Dec 16 03:53 routing
drwxr-xr-x 2 vsduser vsduser 4096 Dec 16 03:53 maglc
drwxr-xr-x 2 vsduser vsduser 4096 Dec 16 03:53 lvs
drwxr-xr-x 2 vsduser vsduser 4096 Dec 16 03:53 klayout
drwxr-xr-x 2 vsduser vsduser 4096 Dec 16 03:53 cvc
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23/tmp$ less merged.lef
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23/tmp$ less merged.lef
x

```

The merged lef file contains information about the layers



```

vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23/tmp

File Edit View Search Terminal Help
PROPERTYDEFINITIONS
LAYER LEFS8_TYPE STRING ;
END PROPERTYDEFINITIONS

# High density, single height
SITE unthd
SYMMETRY Y ;
CLASS CORE ;
SIZE 0.46 BY 2.72 ;
END unthd

# High density, double height
SITE unthddb1
SYMMETRY Y ;
CLASS CORE ;
SIZE 0.46 BY 5.44 ;
END unthddb1

LAYER nwell
TYPE MASTERSLICE ;
PROPERTY LEFS8_TYPE "TYPE NWEEL ;" ;
END nwell

LAYER pwell
TYPE MASTERSLICE ;
PROPERTY LEFS8_TYPE "TYPE PWEEL ;" ;
END pwell

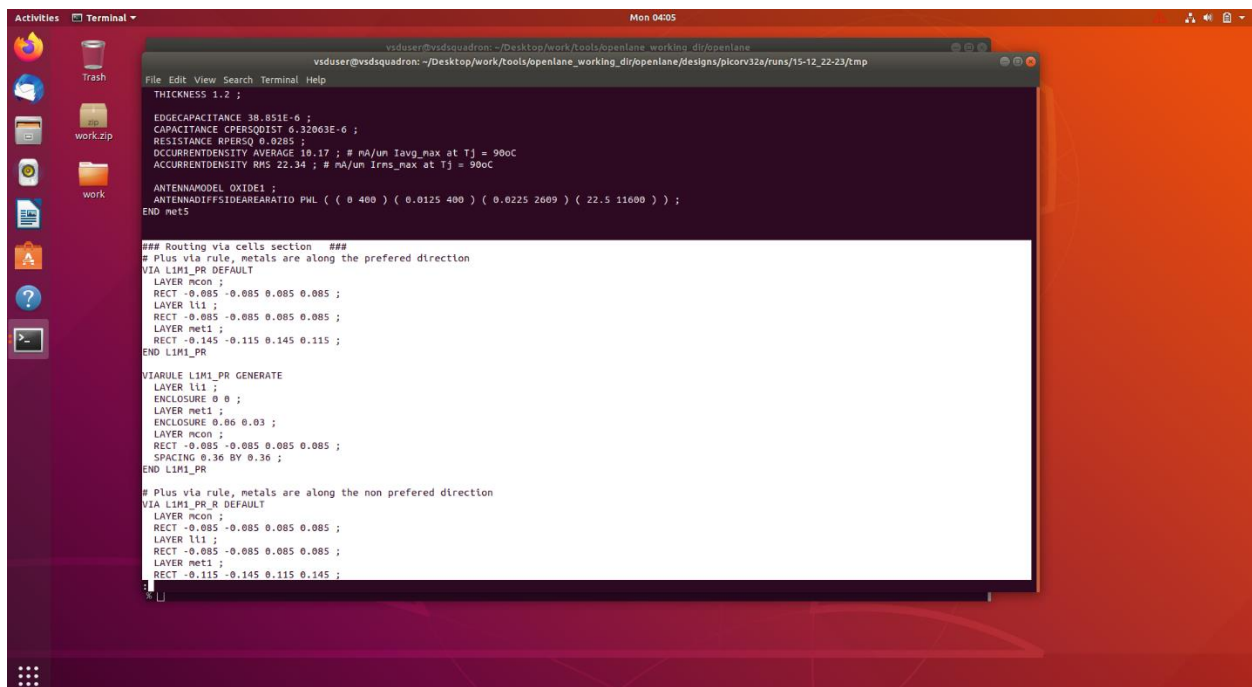
LAYER l11
TYPE ROUTING ;
DIRECTION VERTICAL ;

PITCH 0.46 0.34 ;
OFFSET 0.23 0.17 ;

WIDTH 0.17 ; # LI 1
# SPACING 0.17 ; # LI 2
SPACINGTABLE
PARALLELRUNLENGTH 0
WIDTH 0 0.17 ;
AREA 0.0561 ; # LI 6
THICKNESS 0.1 ;

```

and the pins



```

vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23/tmp

File Edit View Search Terminal Help
THICKNESS 1.2 ;

EDGE CAPACITANCE 38.851E-6 ;
CAPACITANCE CPERSQDIST 6.32063E-6 ;
RESISTANCE RPERSQ 0.0285 ;
OCCURRENTDENSITY AVERAGE 18.17 ; # mA/um Iavg_max at Tj = 90oC
ACCURRENTDENSITY RMS 22.34 ; # mA/um Irms_max at Tj = 90oC

ANTENNA MODEL OXIDE1 ;
ANTENNA DIFFUSION AREA RATIO PHL ( ( 0 400 ) ( 0.0125 400 ) ( 0.0225 2609 ) ( 22.5 11000 ) ) ;
END met5

### Routing via cells section ###
# Plus via rule, metals are along the preferred direction
VIA LIM1_PR DEFAULT
LAYER mcon ;
RECT -0.085 -0.085 0.085 0.085 ;
LAYER l11 ;
RECT -0.085 -0.085 0.085 0.085 ;
LAYER met1 ;
RECT -0.145 -0.115 0.145 0.115 ;
END LIM1_PR

VIARULE LIM1_PR GENERATE
LAYER l11 ;
ENCLOSURE 0 0 ;
LAYER met1 ;
ENCLOSURE 0.06 0.03 ;
LAYER mcon ;
RECT -0.085 -0.085 0.085 0.085 ;
SPACING 0.36 BY 0.36 ;
END LIM1_PR

# Plus via rule, metals are along the non preferred direction
VIA LIM1_PR_R DEFAULT
LAYER mcon ;
RECT -0.085 -0.085 0.085 0.085 ;
LAYER l11 ;
RECT -0.085 -0.085 0.085 0.085 ;
LAYER met1 ;
RECT -0.115 -0.145 0.115 0.145 ;

```



```

vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/plcorv32a/runs/15-12-22-23
total 52
-rwxr-xr-x 1 vdsuser vdsuser 170 Jun 28 2021 PDK_SOURCES
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 tnp
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 results
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 reports
-rw-r--r-- 1 vdsuser vdsuser 1585 Dec 16 03:53 cnds.log
-rw-r--r-- 1 vdsuser vdsuser 15 Dec 16 03:53 OPENLANE_VERSION
-rw-r--r-- 1 vdsuser vdsuser 20869 Dec 16 03:53 config.tcl
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 logs
vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/plcorv32a/runs/15-12-22-23$ cd tnp
vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/plcorv32a/runs/15-12-22-23/tnp$ ls -ltr
total 10620
-rwxr-xr-x 1 vdsuser vdsuser 202 Jun 28 2021 tracks_copy.info
-rw-r--r-- 1 vdsuser vdsuser 2264912 Dec 16 03:53 merged.lef
-rw-r--r-- 1 vdsuser vdsuser 2264912 Dec 16 03:53 net_layers_list.txt
-rw-r--r-- 1 vdsuser vdsuser 2264912 Dec 16 03:53 merged_unpadded.lef
-rwxr-xr-x 1 vdsuser vdsuser 6975 Dec 16 03:53 trimmed.lib.exclude.list
-rw-r--r-- 1 vdsuser vdsuser 6291198 Dec 16 03:53 trimmed.lib
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 synthesis
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 placement
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 floorplan
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 cts
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 routing
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 magic
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 lvs
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 layout
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 cvc
vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/plcorv32a/runs/15-12-22-23/tnp$ less merged.lef
vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/plcorv32a/runs/15-12-22-23/tnp$ less merged.lef
vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/plcorv32a/runs/15-12-22-23/tnp$ cd ../
vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/plcorv32a/runs/15-12-22-23$ ls -ltr
total 52
-rwxr-xr-x 1 vdsuser vdsuser 170 Jun 28 2021 PDK_SOURCES
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 tnp
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 results
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 reports
-rw-r--r-- 1 vdsuser vdsuser 1585 Dec 16 03:53 cnds.log
-rw-r--r-- 1 vdsuser vdsuser 15 Dec 16 03:53 OPENLANE_VERSION
-rw-r--r-- 1 vdsuser vdsuser 20869 Dec 16 03:53 config.tcl
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 logs
vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/plcorv32a/runs/15-12-22-23$ less config.tcl
%

```

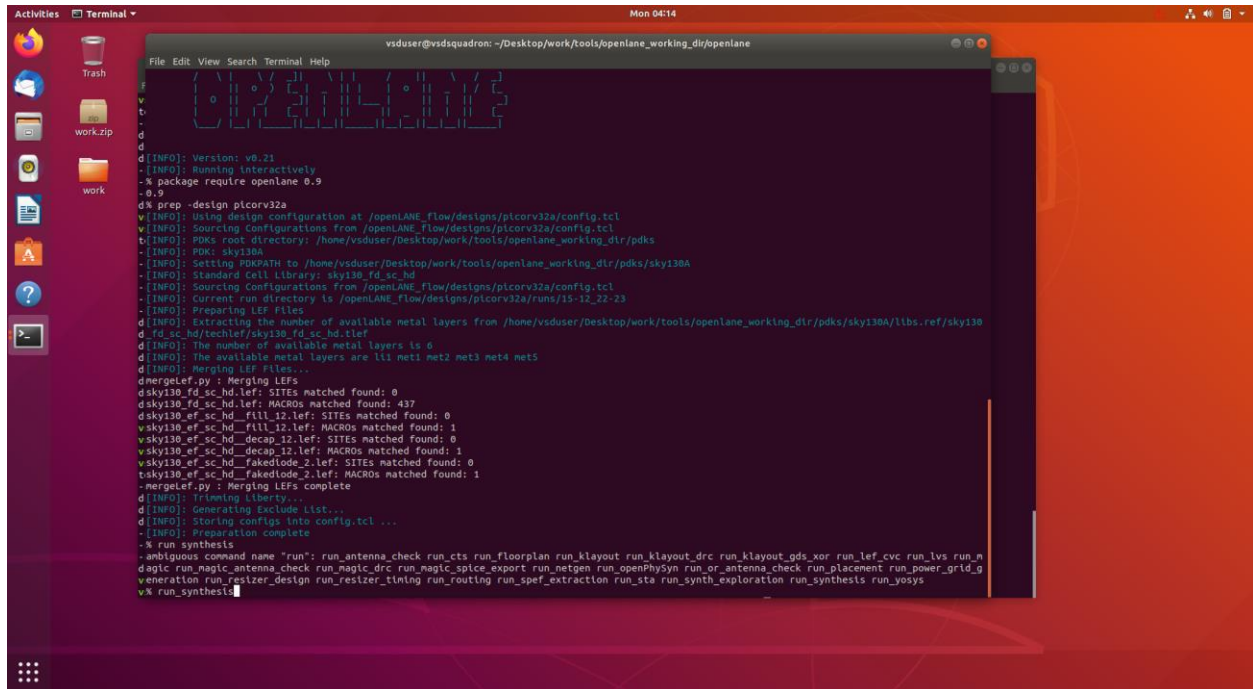
This config.tcl contains global information

```

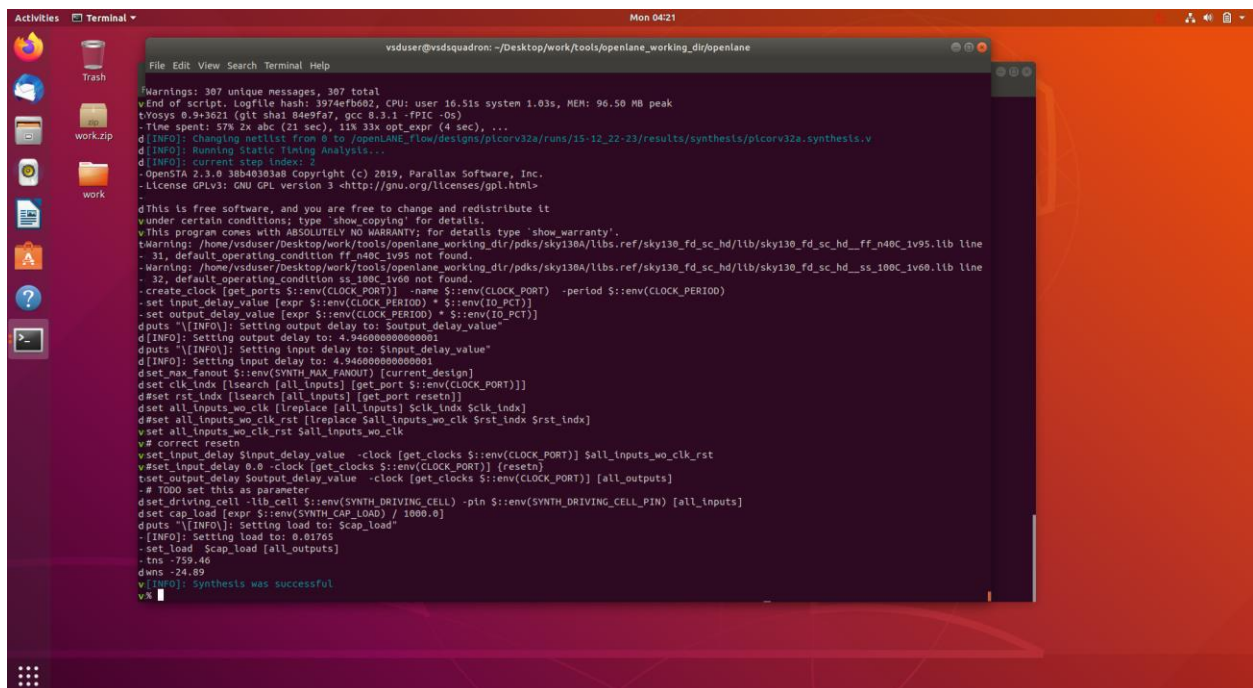
vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/plcorv32a/runs/15-12-22-23
# Run Config
set ::env(PDK_ROOT) "/home/vdsuser/Desktop/work/tools/openlane_working_dir/pdks"
set ::env(BASE_SDC_FILE) "/openlane_flow/scripts/base.sdc"
set ::env(BOTTOM_MARGIN_MULT) "4"
set ::env(CARRY_SELECT_REDUCER_MAP) "/home/vdsuser/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech/openlane/sky130_fd_sc_hd/csa_map.v"
set ::env(CELLS_LEF) "/openlane_flow/designs/plcorv32a/runs/15-12-22-23/tnp/merged.lef"
set ::env(CELLS_LEF_UNPADDED) "/openlane_flow/designs/plcorv32a/runs/15-12-22-23/tnp/merged_unpadded.lef"
set ::env(CELL_CLK_PORT) "CLK"
set ::env(CELL_PAD) "4"
set ::env(CELL_PAD_EXCLUDE) "sky130_fd_sc_hd_tap* sky130_fd_sc_hd_decap* sky130_fd_sc_hd_fill*"
set ::env(CHECK_ASSIGN_STATEMENTS) "0"
set ::env(CHECK_UNMAPPED_CELLS) "1"
set ::env(CLK_BUFFER) "sky130_fd_sc_hd_clkbuf_4"
set ::env(CLK_BUFFER_INPUT) "A"
set ::env(CLK_BUFFER_OUTPUT) "X"
set ::env(CLOCK_BUFFER_FANOUT) "16"
set ::env(CLOCK_NET) "clk"
set ::env(CLOCK_PERIOD) "24.73"
set ::env(CLOCK_PORT) "clk"
set ::env(CLOCK_TREE_SYNTH) "1"
set ::env(COMPIGS) "/openlane_flow/configuration/floorplan.tcl /openlane_flow/configuration/synthesis.tcl /openlane_flow/configuration/general.tcl /openlane_flow/configuration/checkers.tcl /openlane_flow/configuration/lvs.tcl /openlane_flow/configuration/cts.tcl /openlane_flow/configuration/routing.tcl /openlane_flow/configuration/placement.tcl"
set ::env(CTS_CLK_BUFFER_LIST) "sky130_fd_sc_hd_clkbuf_1 sky130_fd_sc_hd_clkbuf_2 sky130_fd_sc_hd_clkbuf_4 sky130_fd_sc_hd_clkbuf_8"
set ::env(CTS_MAX_CAP) "1.53169"
set ::env(CTS_REPORT_TIMING) "1"
set ::env(CTS_ROOT_BUFFER) "sky130_fd_sc_hd_clkbuf_16"
set ::env(CTS_SINK_CLUSTERING_MAX_DIAMETER) "50"
set ::env(CTS_SINK_CLUSTERING_SIZE) "20"
set ::env(CTS_SQR_CAP) "0.25e-3"
set ::env(CTS_SQR_RES) "0.125"
set ::env(CTS_TARGET_SKEW) "200"
set ::env(CTS_TECH_DIR) "N/A"
set ::env(CTS_TOLERANCE) "100"
set ::env(DECAP_CELL) "sky130_fd_sc_hd_decap_"
set ::env(DEF_UNITS_PER_MICRON) "1000"
set ::env(DESIGN_CONFIG) "/openlane_flow/designs/plcorv32a/config.tcl"
set ::env(DESIGN_DIR) "/openlane_flow/designs/plcorv32a"
set ::env(DESIGN_IS_CORE) "1"
set ::env(DESIGN_NAME) "plcorv32a"
set ::env(DETAILED_ROUTER) "tritonroute"
set ::env(DIODE_CELL) "sky130_fd_sc_hd_diode_2"
%

```


Run synthesis through the `run_synthesis` command



Synthesis is successful message indicates synthesis is complete



The various reports can be seen by scrolling up a bit

```

vvsuser@vvsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
File Edit View Search Terminal Help
#
sky130_fd_sc_hd__nand2_2 78
sky130_fd_sc_hd__nor2_2 524
v sky130_fd_sc_hd__nor2b_2 1
t sky130_fd_sc_hd__nor3_2 42
- sky130_fd_sc_hd__nor4_2 1
d sky130_fd_sc_hd__o2111a_2 2
d sky130_fd_sc_hd__o211a_2 69
- sky130_fd_sc_hd__o21a_2 54
- sky130_fd_sc_hd__o21a1_2 141
- sky130_fd_sc_hd__o21ba_2 200
d sky130_fd_sc_hd__o21ba1_2 1
v sky130_fd_sc_hd__o221a_2 204
sky130_fd_sc_hd__o221a1_2 7
t sky130_fd_sc_hd__o22a_2 1312
- sky130_fd_sc_hd__o22a1_2 59
- sky130_fd_sc_hd__o2bb2a_2 119
sky130_fd_sc_hd__o2bb2a1_2 92
- sky130_fd_sc_hd__o311a_2 8
- sky130_fd_sc_hd__o31a_2 19
- sky130_fd_sc_hd__o31a1_2 1
d sky130_fd_sc_hd__o32a_2 109
d sky130_fd_sc_hd__o41a_2 2
d sky130_fd_sc_hd__or2_2 1088
d sky130_fd_sc_hd__or2b_2 25
d sky130_fd_sc_hd__or3_2 68
d sky130_fd_sc_hd__or3b_2 5
d sky130_fd_sc_hd__or4_2 93
d sky130_fd_sc_hd__or4b_2 6
d sky130_fd_sc_hd__or4bb_2 2
v
v Chip area for module 'picorv32a': 147712.918400
v
v29. Executing Verilog backend.
tDumping module 'picorv32a'.

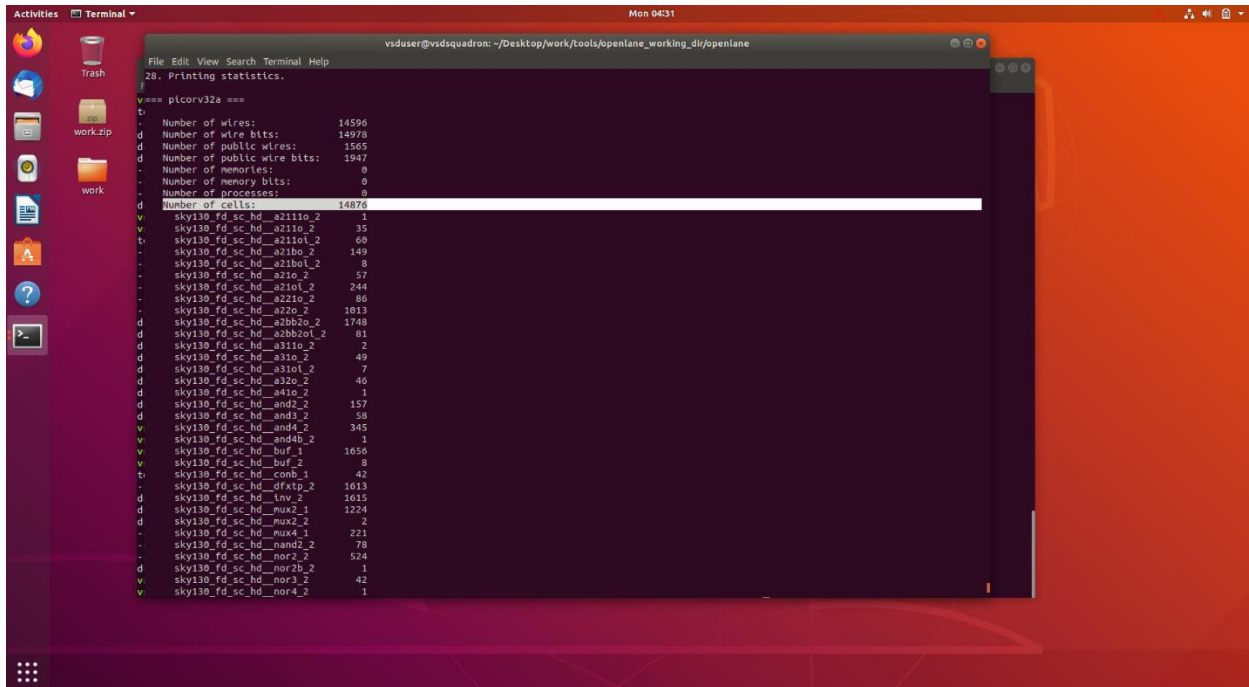
dWarnings: 307 unique messages, 307 total
dEnd of script. Logfile hash: 3974efb002, CPU: user 16.51s system 1.03s, MEM: 96.50 MB peak
dVosys 0.9+3621 (git sha1 84e9fa7, gcc 8.3.1 -fPIC -Os)
-Time spent: 57k 2x abc (21 sec), 11k 33x opt_expr (4 sec), ...
-[INFO]: Changing netlist from v to /openlane_/flow/design/picorv32a/runs/15-12-22-23/results/synthesis/picorv32a.synthesis.v
-[INFO]: Running Static Timing Analysis...
d[INFO]: current step index: 2
vOpenSTA 2.3.0 30b4030208 Copyright (c) 2019, Parallax Software, Inc.
vLicense GPLv3: GNU GPL version 3 <http://gnu.org/licenses/gpl.html>

```

```

vvsuser@vvsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
File Edit View Search Terminal Help
#
28. Printing statistics.
#
v=== picorv32a ===
t- Number of wires: 14596
d- Number of wire bits: 14978
d- Number of public wires: 1565
d- Number of public wire bits: 1947
- Number of memories: 0
- Number of memory bits: 0
- Number of processes: 0
d- Number of cells: 14876
v sky130_fd_sc_hd__a2111a_2 1
v sky130_fd_sc_hd__a211a_2 35
t sky130_fd_sc_hd__a211a1_2 60
- sky130_fd_sc_hd__a21b0_2 149
sky130_fd_sc_hd__a21b0a1_2 8
- sky130_fd_sc_hd__a21a_2 57
- sky130_fd_sc_hd__a21a1_2 244
- sky130_fd_sc_hd__a22a_2 86
- sky130_fd_sc_hd__a22a1_2 1013
d sky130_fd_sc_hd__a2bb2a_2 1748
d sky130_fd_sc_hd__a2bb2a1_2 81
d sky130_fd_sc_hd__a311a_2 2
d sky130_fd_sc_hd__a31a_2 49
d sky130_fd_sc_hd__a31a1_2 7
d sky130_fd_sc_hd__a32a_2 46
d sky130_fd_sc_hd__a41a_2 1
d sky130_fd_sc_hd__a41a1_2 157
d sky130_fd_sc_hd__and3_2 58
v sky130_fd_sc_hd__and4_2 345
v sky130_fd_sc_hd__and4b_2 1
v sky130_fd_sc_hd__buf_1 1656
v sky130_fd_sc_hd__buf_2 8
t sky130_fd_sc_hd__comb_1 42
- sky130_fd_sc_hd__dflip_2 1613
d sky130_fd_sc_hd__inv_2 1615
d sky130_fd_sc_hd__mux2_1 1224
d sky130_fd_sc_hd__mux2_2 2
- sky130_fd_sc_hd__muxa_1 221
- sky130_fd_sc_hd__nand2_2 78
sky130_fd_sc_hd__nor2_2 524
d sky130_fd_sc_hd__nor2b_2 1
v sky130_fd_sc_hd__nor3_2 42
v sky130_fd_sc_hd__nor4_2 1

```

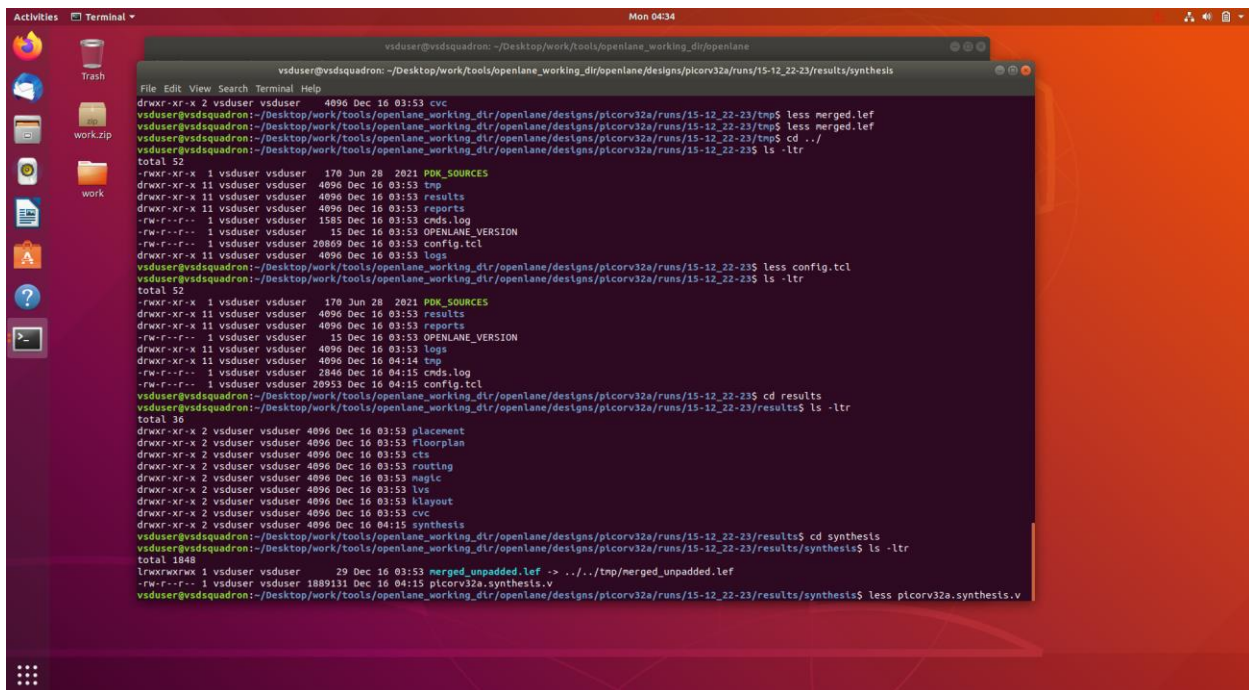


```

v===== picorv32a =====
t:
- Number of wires: 14596
d: Number of wire bits: 14978
d: Number of public wires: 1565
d: Number of public wire bits: 1947
- Number of memories: 0
- Number of memory bits: 0
- Number of processes: 0
d: Number of cells: 14876
v
sky130_fd_sc_hd__a21110_2 1
sky130_fd_sc_hd__a2110_2 35
sky130_fd_sc_hd__a2110l_2 60
sky130_fd_sc_hd__a21b0_2 149
sky130_fd_sc_hd__a21b0l_2 8
sky130_fd_sc_hd__a21c_2 57
sky130_fd_sc_hd__a210l_2 244
sky130_fd_sc_hd__a2210_2 86
sky130_fd_sc_hd__a22c_2 1013
sky130_fd_sc_hd__a2bb20_2 1748
sky130_fd_sc_hd__a2bb20l_2 81
sky130_fd_sc_hd__a3110_2 2
sky130_fd_sc_hd__a31c_2 49
sky130_fd_sc_hd__a310l_2 7
sky130_fd_sc_hd__a32c_2 46
sky130_fd_sc_hd__a410_2 1
sky130_fd_sc_hd__and3_2 157
sky130_fd_sc_hd__and3_2 58
sky130_fd_sc_hd__and4_2 345
sky130_fd_sc_hd__and4b_2 1
sky130_fd_sc_hd__buf_1 1050
sky130_fd_sc_hd__buf_2 8
sky130_fd_sc_hd__comb_1 42
sky130_fd_sc_hd__dffatp_2 1613
sky130_fd_sc_hd__lrv_2 1615
sky130_fd_sc_hd__mux2_1 1224
sky130_fd_sc_hd__mux2_2 2
sky130_fd_sc_hd__mux1_1 221
sky130_fd_sc_hd__nand2_2 78
sky130_fd_sc_hd__nor2_2 524
sky130_fd_sc_hd__nor3_2 42
sky130_fd_sc_hd__nor4_2 1

```

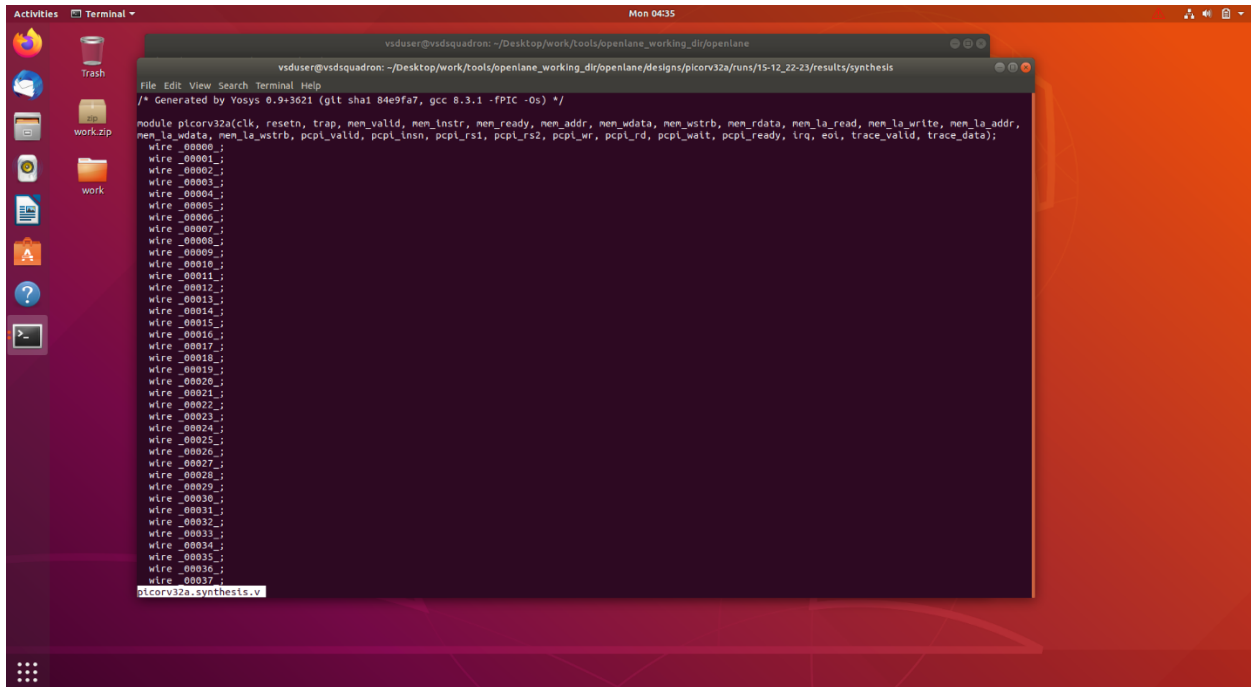
and also can be viewed in the results and reports folder



```

drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 cvc
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 tmp
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23/tmp$ less merged.lef
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23/tmp$ cd ../
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23$ ls -ltr
total 52
-rwxr-xr-x 1 vdsuser vdsuser 170 Jun 28 2021 PDK_SOURCES
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 tmp
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 results
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 reports
-rw-r--r-- 1 vdsuser vdsuser 1585 Dec 16 03:53 cmds.log
-rw-r--r-- 1 vdsuser vdsuser 15 Dec 16 03:53 OPENLANE_VERSION
-rw-r--r-- 1 vdsuser vdsuser 20869 Dec 16 03:53 config.tcl
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 logs
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23$ less config.tcl
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23$ ls -ltr
total 52
-rwxr-xr-x 1 vdsuser vdsuser 170 Jun 28 2021 PDK_SOURCES
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 tmp
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 results
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 reports
-rw-r--r-- 1 vdsuser vdsuser 15 Dec 16 03:53 OPENLANE_VERSION
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 logs
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 04:14 tmp
-rw-r--r-- 1 vdsuser vdsuser 2846 Dec 16 04:15 cmds.log
-rw-r--r-- 1 vdsuser vdsuser 20953 Dec 16 04:15 config.tcl
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23$ cd results
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23/results$ ls -ltr
total 36
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 placement
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 floorplan
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 cts
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 routing
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 magtc
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 lvs
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 layout
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 cvc
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 04:15 synthesis
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23/results$ cd synthesis
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23/results/synthesis$ ls -ltr
total 1848
lrwxrwxrwx 1 vdsuser vdsuser 29 Dec 16 03:53 merged_unpadded.lef -> ../../tmp/merged_unpadded.lef
-rw-r--r-- 1 vdsuser vdsuser 1889131 Dec 16 04:15 picorv32a.synthesis.v
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/15-12-22-23/results/synthesis$ less picorv32a.synthesis.v

```

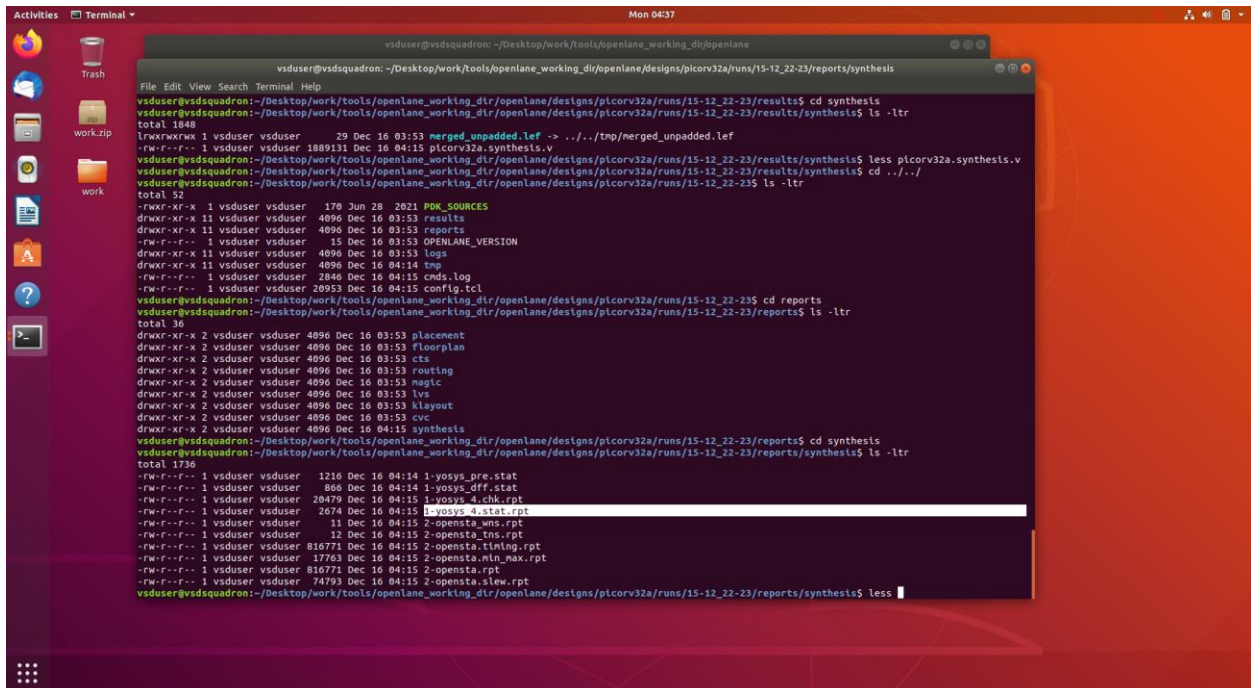



```

vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
File Edit View Search Terminal Help
/* Generated by Yosys 0.9+3621 (git sha1 04e9fa7, gcc 8.3.1 -fPIC -Os) */

module p1corv32a(clk, resetn, trap, mem_valid, mem_instr, mem_ready, mem_addr, mem_wdata, mem_wstrb, mem_rdata, mem_la_read, mem_la_write, mem_la_addr,
mem_la_wdata, mem_la_wstrb, pcpl_valid, pcpl_insn, pcpl_rs1, pcpl_rs2, pcpl_wr, pcpl_rd, pcpl_wait, pcpl_ready, lrq, eol, trace_valid, trace_data);
    wire _00001;
    wire _00002;
    wire _00003;
    wire _00004;
    wire _00005;
    wire _00006;
    wire _00007;
    wire _00008;
    wire _00009;
    wire _00010;
    wire _00011;
    wire _00012;
    wire _00013;
    wire _00014;
    wire _00015;
    wire _00016;
    wire _00017;
    wire _00018;
    wire _00019;
    wire _00020;
    wire _00021;
    wire _00022;
    wire _00023;
    wire _00024;
    wire _00025;
    wire _00026;
    wire _00027;
    wire _00028;
    wire _00029;
    wire _00030;
    wire _00031;
    wire _00032;
    wire _00033;
    wire _00034;
    wire _00035;
    wire _00036;
    wire _00037;
p1corv32a_synthesis.v

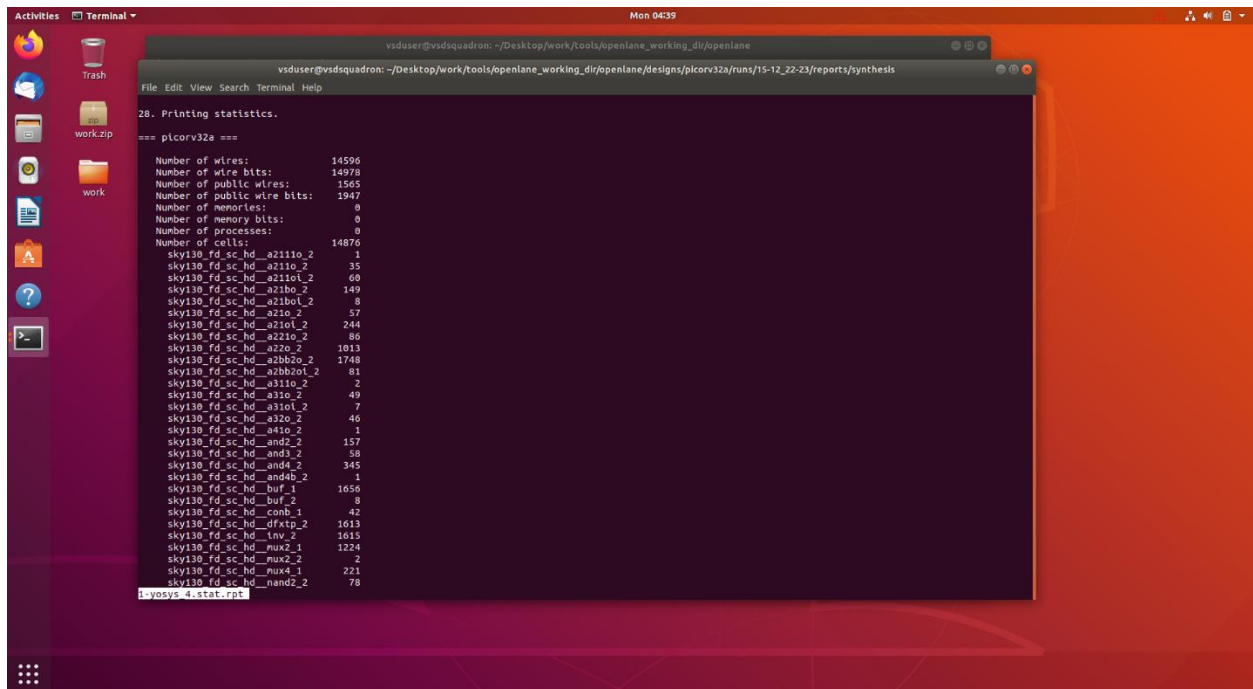
```



```

vdsuser@vdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
File Edit View Search Terminal Help
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/p1corv32a/runs/15-12-22-23/results$ cd synthesis
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/p1corv32a/runs/15-12-22-23/results/synthesis$ ls -ltr
total 1848
-rwxr-xr-x 1 vdsuser vdsuser 29 Dec 16 03:53 merged_unpadded.lef -> ../tftp/merged_unpadded.lef
-rw-r--r-- 1 vdsuser vdsuser 1889131 Dec 16 04:15 p1corv32a_synthesis.v
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/p1corv32a/runs/15-12-22-23/results/synthesis$ less p1corv32a_synthesis.v
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/p1corv32a/runs/15-12-22-23/results/synthesis$ cd ../..
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/p1corv32a/runs/15-12-22-23$ ls -ltr
total 52
-rwxr-xr-x 1 vdsuser vdsuser 170 Jun 28 2021 PDK_SOURCES
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 results
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 reports
-rw-r--r-- 1 vdsuser vdsuser 15 Dec 16 03:53 OPENLANE_VERSION
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 03:53 logs
drwxr-xr-x 11 vdsuser vdsuser 4096 Dec 16 04:14 tmp
-rw-r--r-- 1 vdsuser vdsuser 2846 Dec 16 04:15 cmds.log
-rw-r--r-- 1 vdsuser vdsuser 20953 Dec 16 04:15 config.tcl
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/p1corv32a/runs/15-12-22-23$ cd reports
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/p1corv32a/runs/15-12-22-23/reports$ ls -ltr
total 36
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 placement
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 floorplan
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 cts
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 routing
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 magtc
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 lvs
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 klayout
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 03:53 cvc
drwxr-xr-x 2 vdsuser vdsuser 4096 Dec 16 04:15 synthesis
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/p1corv32a/runs/15-12-22-23/reports$ cd synthesis
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/p1corv32a/runs/15-12-22-23/reports/synthesis$ ls -ltr
total 1736
-rw-r--r-- 1 vdsuser vdsuser 1216 Dec 16 04:14 1-yosys_pre.stat
-rw-r--r-- 1 vdsuser vdsuser 666 Dec 16 04:14 1-yosys_dff.stat
-rw-r--r-- 1 vdsuser vdsuser 28479 Dec 16 04:15 1-yosys_4.chk.rpt
-rw-r--r-- 1 vdsuser vdsuser 2674 Dec 16 04:15 1-yosys_4.stat.rpt
-rw-r--r-- 1 vdsuser vdsuser 11 Dec 16 04:15 2-opensta_mn3.rpt
-rw-r--r-- 1 vdsuser vdsuser 12 Dec 16 04:15 2-opensta_tns.rpt
-rw-r--r-- 1 vdsuser vdsuser 816771 Dec 16 04:15 2-opensta_tnlng.rpt
-rw-r--r-- 1 vdsuser vdsuser 17763 Dec 16 04:15 2-opensta_mtn_max.rpt
-rw-r--r-- 1 vdsuser vdsuser 816771 Dec 16 04:15 2-opensta.rpt
-rw-r--r-- 1 vdsuser vdsuser 74793 Dec 16 04:15 2-opensta_slew.rpt
vdsuser@vdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/p1corv32a/runs/15-12-22-23/reports/synthesis$ less

```



The screenshot shows a terminal window on a Linux desktop. The terminal displays the output of a synthesis tool, specifically the 'Printing statistics' section for a design named 'plcorv32a'. The statistics include the number of wires, wire bits, public wires, public wire bits, memories, memory bits, processes, and cells. A detailed list of cells follows, showing their names and counts. The desktop background is orange, and the terminal window has a dark background with light text.

```
28. Printing statistics.
=== plcorv32a ===
Number of wires:          14596
Number of wire bits:      14978
Number of public wires:   1565
Number of public wire bits: 1947
Number of memories:       0
Number of memory bits:    0
Number of processes:      0
Number of cells:          14876
sky130_fd_sc_hd_a211i0_2  1
sky130_fd_sc_hd_a211i0_2  35
sky130_fd_sc_hd_a211i0_2  68
sky130_fd_sc_hd_a21b0_2   149
sky130_fd_sc_hd_a21b0_2   8
sky130_fd_sc_hd_a21b0_2   57
sky130_fd_sc_hd_a21i0_2   244
sky130_fd_sc_hd_a22i0_2   86
sky130_fd_sc_hd_a22i0_2  1013
sky130_fd_sc_hd_a2bb20_2  1748
sky130_fd_sc_hd_a2bb20i_2  81
sky130_fd_sc_hd_a31i0_2   2
sky130_fd_sc_hd_a31i0_2  49
sky130_fd_sc_hd_a31i0_2   7
sky130_fd_sc_hd_a32i0_2   46
sky130_fd_sc_hd_a41i0_2   1
sky130_fd_sc_hd_and2_2    157
sky130_fd_sc_hd_and3_2    34
sky130_fd_sc_hd_and4_2    345
sky130_fd_sc_hd_and4b_2   1
sky130_fd_sc_hd_buf_1     1656
sky130_fd_sc_hd_buf_2     8
sky130_fd_sc_hd_conb_1    42
sky130_fd_sc_hd_dfxtp_2   1613
sky130_fd_sc_hd_lnv_2     1615
sky130_fd_sc_hd_mux2_1    1224
sky130_fd_sc_hd_mux2_2     2
sky130_fd_sc_hd_mux4_1    221
sky130_fd_sc_hd_nand2_2    78
i: Yosys 4.stat.rpt
```

Flop ratio is the number of D-FFs divided by the number of cells which comes out to be 0.1084 or 10.84%.